

REMARKS

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Claim Amendments

Claims 2 and 4-12 have been amended to make editorial changes, in order to better comply with U.S. practice. Claims 7 and 9-12 have also been amended as suggested by the Examiner.

Applicants note that claims 7, 8, 11 and 12 have been amended to delete subject matter which is repetitive, as the characteristics of the cake of precipitated silica are recited in claim 1, upon which these claims indirectly depend.

No new matter has been added to the application by these amendments.

Claim Objections

The objection to claims 7 and 9-12 has been rendered moot in view of the claim amendments, discussed above.

Patentability Arguments

The patentability of the present invention over the disclosures of the references relied upon by the Examiner in rejecting the claims will be apparent upon consideration of the following remarks.

Rejections Under 35 U.S.C. §103(a)

The rejection of claims 1-8 under 35 U.S.C. § 103(a) as being unpatentable over Kono et al. (U.S. 6,417,264) in view of Hiroshi (JP 9142827); as well as the rejection of claims 9-12 under 35 U.S.C. § 103(a) as being unpatentable over Kono et al. in view of Hiroshi as applied to claim 1 above, and further in view of Ichinose et al. (U.S. 2003/0039808), are respectfully traversed.

The Position of the Examiner

The Examiner takes the position that Kono et al. disclose an easily dispersible precipitated silica cake, wherein the precipitated silica has a BET specific surface area of 280 m²/g, and wherein ion-exchange water is added to the easily dispersible cake to provide an aqueous dispersion of the silica, said dispersion being stirred with a propeller mixer to affect a preliminary dispersion, a resultant slurry being treated to be dispersed with a high-pressure homogenizer once at a processing pressure of 78MPa, and further diluted to reduce the silica concentration to 1.5% by weight, the resultant dispersion having a light-scattering index of at least 2.

The Examiner relies on Hiroshi as disclosing a silica concentration of 5% by weight in the aqueous dispersion of silica, and a pH of a reaction mixture maintained at a fixed value greater than 8. The Examiner asserts that it would have been obvious to modify the products and processes of Kono et al. with the process conditions of Hiroshi in order to obtain an exceptionally stable silica dispersion with a reasonable expectation of success.

Additionally, the Examiner relies upon Ichinose et al. as disclosing a coating liquid for ink-jet recording sheets, and a process of making, comprising dispersing silica, a binder, and a cationic polymer in a polar solvent. The Examiner asserts that it would have been obvious to one of ordinary skill in the art to modify the product and process of the aforementioned applied art with the binder of Ichinose et al. in order to obtain an effective coating liquid for ink-jet recording sheets with a reasonable expectation of success.

Applicants' Arguments

Applicants respectfully disagree with the Examiner's positions for the following reasons.

Applicants' independent claim 1 recites an easily dispersible cake of precipitated silica, with the following characteristics:

- It is a cake of precipitated silica,
- It has a BET specific surface area of at least 220 m²/g, and
- Its dispersion has a light-scattering index (n-value) of at least 2. The dispersion is prepared by adding ion-exchange water to the cake to provide an aqueous

dispersion of the silica with a concentration of 5% by weight, followed by stirring the dispersion with a propeller mixer to affect a preliminary dispersion, and dispersing the resulting slurry by treating it once with a high-pressure homogenizer at a processing pressure of 78 MPa, and diluting the dispersion to reduce the silica concentration to 1.5% by weight.

The requirement of “light-scattering index (n-value) of at least 2” is an index of easy dispersibility of the cake.

Applicants’ claim 3 recites a process for producing the easily dispersible cake of precipitated silica of claim 1, wherein the process comprises:

- Using a liquid selected from the group consisting of aqueous alkali silicate solution, alkaline aqueous solution of which pH is adjusted with a basic substance, and water as an initial reaction liquid,
- Simultaneously adding an alkali silicate and a mineral acid to the reaction liquid,
- Maintaining pH of the reaction liquid at a fixed value within a range of 7.5 - 11.5,
- Maintaining the temperature of the reaction liquid at not lower than 90°C, and
- Separating the precipitated silica from the reaction liquid in wet state.

Where the above reaction conditions are satisfied, the easily dispersible cake of precipitated silica according to claim 1 can be obtained.

Claim 1

As stated above, the Examiner makes the assertion that the precipitated silica cake of Kono et al. satisfies the limitations of Applicants’ claims. In order to demonstrate that the cake of precipitated silica as described by Kono et al. is not the easily dispersible precipitated silica cake as defined in Applicants’ claim 1, Hirokatsu Hayashi (one of the inventors of the present application) has reproduced Example 5 of Kono et al. (i.e., Reference Example discussed in column 7, lines 1-15 of the reference). The results are set forth in a Declaration (Under 37 CFR 1.132), submitted herewith.

As discussed in detail in the attached Declaration, the cake of the precipitated silica as

obtained in Example 5 of Kono et al. 5 had a light scattering index (n-value) of 1.6, when dispersed in ion-exchange water with the high-pressure homogenizer once, to provide an aqueous dispersion of silica having a concentration of 5% by weight and thereafter diluted to the concentration of 1.5% by weight. This value indicates that the precipitated silica cake of Kono et al. is not easily dispersible, i.e., it does not have the light-scattering index required by Applicants' claims. Therefore, Kono et al. fail to anticipate or render obvious the easily dispersible cake of precipitated silica of Applicants' independent claim 1.

In item 5 of the Official Action, the Examiner states that Kono et al. disclose, "a resultant slurry being treated to be dispersed with a high-pressure homogenizer once (Kono, c. 5, l. 66-67; c. 6, l. 1-3; Examples 6-9) . . . the resultant dispersion having a light scattering-index (n-value) of at least 2." However, as is clear from the results set forth in the Declaration, when a 5 wt% dispersion of the cake of precipitated silica disclosed by Kono et al. is treated once with a high-pressure homogenizer, and further diluted, the resultant aqueous dispersion has a n-value of less than 2 (i.e., 1.6). Thus, as stated above, the cake of precipitated silica of Kono et al. is not easily dispersible.

Additionally, the starting silica in the silica slurries which were treated with the high-pressure homogenizer in Examples 6-9 of Kono et al., as referred to by the Examiner, was not precipitated silica, but was dry processed silica. This is the very reason the aqueous dispersions of Kono et al., after their single high-pressure homogenizer treatment, gave a light-scattering index (n-value) of not less than 2. However, this does not anticipate or render obvious Applicants' claims, because Applicants' claims require precipitated silica, rather than dry processed silica.

Accordingly, the Examiner's position that Kono et al. disclose a precipitated silica cake whose n-value as measured after the slurry of the precipitated silica cake is given a dispersing treatment once with a high-pressure homogenizer is at least 2 is untenable.

As discussed above, Hiroshi is relied upon as teaching a particular concentration and pH. Therefore, Hiroshi fails to remedy the deficiencies of Kono et al.

Accordingly, the subject matter of Applicants' independent claim 1, as well as the claims dependent thereon, is clearly patentable over the teachings of Kono et al. in view of Hiroshi.

Claim 3

In item 7 of the Official Action, Examiner states that Kono et al. disclose maintenance of temperature of the reaction liquid at 95°C. However, as stated by Kono et al, "This solution was heated up to 40°C and neutralized to a neutralization rate of 50% with 22 wt% sulfuric acid, and then the reaction liquid was heated to a temperature of 95°C. Sulfuric acid described above was added to this reaction liquid until the neutralization rate came up to 100%." (Please see column 7, lines 6-11 of the reference.) In the process of Kono et al., the reaction temperature was not maintained at 95°C throughout, but rather was initially 40°C, and then raised to and kept at 95°C. Thus, it is untenable to state that Kono et al. disclose maintaining the temperature of the reaction liquid at not lower than 90°C throughout, as required by Applicants' claim 3.

Also in item 7 of the Official Action, the Examiner points out that Kono et al. disclose "adding sodium silicate and sulfuric acid to water" (the reaction liquid). However, Kono et al. actually disclose separately adding an alkali silicate and sulfuric acid to the reaction liquid. (Please see Example 5 and Reference Example of Kono). Thus, Kono et al. fail to teach or suggest the simultaneous addition of an alkali silicate and mineral acid (sulfuric acid) to the reaction liquid, as required by Applicants' claim 3.

In item 15 of the Official Action, the Examiner points out that Hiroshi discloses (in paragraph [0055]) maintaining the pH of the reaction mixture at a fixed value of greater than 8. However, the silica slurry as described in paragraph [0055] of Hiroshi is a silica slurry before being dispersed with a high-pressure homogenizer, not a reaction liquid at the production time of wet silica, as in the process of Applicants' claim 3. Thus, Hiroshi fails to teach or suggest maintaining pH of the reaction liquid at a fixed value within a range of 7.5 - 11.5, as required by Applicants' claim 3.

Applicants' claim 3 recites a process for producing the easily dispersible cake of

precipitated silica of claim 1, which has the n-value recited in claim 1, as measured by the specified method, wherein an alkali silicate and a mineral acid are simultaneously added to the reaction liquid of which pH is maintained at a fixed value within a range of 7.5 - 11.5, and of which temperature is maintained at no lower than 90°C.

For the reasons discussed above, the subject matter of Applicants' claim 3, as well as the claims dependent thereon, is clearly patentable over the teachings of Kono et al. in view of Hiroshi.

As previously stated, Ichinose et al. is relied upon as teaching a binder. Accordingly Ichinose et al. fail to remedy the deficiencies of Kono et al. in view of Hiroshi.

Claims 1 and 3 are clearly patentable over the cited combinations of references for the reasons stated above. Since claims 2 and 4-12 are directly or indirectly dependent on either claim 1 or 3, the subject matter of claims 2 and 4-12 is patentable over the cited combinations of references for the same reasons.

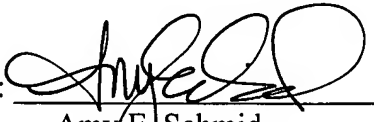
Conclusion

Therefore, in view of the foregoing amendments and remarks, it is submitted that each of the grounds of objection and rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, the Examiner is respectfully requested to contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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